

Expanding FIREHouse (the Northwest Fire Research Clearinghouse) to Alaska

(In response to AFP 2005-4, Task 2: *Produce readily understandable and useable information synthesis or transfer products on key topics of critical interest to the fire and fuels management community.*)

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Abstract:

We propose to expand the Northwest Fire Research Clearinghouse (FIREHouse) (see <http://www.fs.fed.us/pnw/fera/firehouse>) to include projects relevant specifically to fire management in Alaska. FIREHouse was originally funded by the Joint Fire Science Program (JFSP) in 2003 (project number 03-4-2-06: A regional information node for fire science in the Pacific Northwest, in response to AFP 2003-4, Task 2), and the current goal is to provide user-friendly, web-based documentation and data on fire science and technology relevant to Washington, Oregon and Idaho. As of December 2004, FIREHouse has posted information about 23 projects (and over 30 more projects are pending approval by the researchers), many of which were funded either by JFSP or the National Fire Plan (NFP). For each project posted, the goal is to provide, as applicable, online, searchable access to: 1) metadata; 2) on-line publications; 3) bibliographic information, proposals, and study plans; 4) links to other sources of fire information; 5) information about technology transfer and applications in resource management; and 6) an educational component that uses common language and graphics to explain important findings. FIREHouse also offers server space, web and database support for researchers who choose to post their primary data on FIREHouse. As was originally proposed, the primary focus of FIREHouse has been to provide information about research based in the Northwest. However, there are several JFSP-funded projects focused solely or partly on research in Alaska, as well as numerous other projects funded by other entities, spread out across various agencies (e.g., National Park Service, BLM-Alaska Fire Service, and US Fish and Wildlife Service fire-effects data; the multi-agency Alaska Fire References Database; the interagency FROSTFIRE project; forest health protection projects; fire history projects) that would lend well to online, more centralized access through FIREHouse. Two substantial deliverables included in the proposed expansion are the development of an online map interface displaying fire-effects plot metadata in Alaska, and the advancement of the Alaska Fire Reference Database by converting it into an online, searchable bibliographic database. Expanding FIREHouse to include Alaska addresses AFP 2005-4 Task 2 by facilitating the user-friendly dissemination of fire research to Alaska's resource managers, decision makers, and the general public.

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Introduction

Project Justification

The November 2004 Arctic Climate Impact Assessment states that “climate change is projected to result in major impacts inside the Arctic, some of which are already underway” and “disturbances such as insect outbreaks and forest fires are very likely to increase in frequency, severity, and duration” (ACIA 2004). The report was substantiated by the fact that a record 6.7 million acres burned in Alaska during the 2004 wildfire season (Alaska Fire Service 2004). Both the report and the extreme wildfire season illustrate the growing recognition of the dominant role fire plays in many of Alaska’s ecosystems.

The Joint Fire Science Program (JFSP) and National Fire Plan (NFP) provide millions of dollars each year to agencies and organizations to assist them in researching fire and reducing fire hazards across the United States. In addition, a substantial number of fire studies are conducted in-house by agencies or through universities. Results from these studies are often underutilized because data and reports are not readily available. Meanwhile, large-scale projects (e.g., LANDFIRE, Fuel Characteristic Classification System) are looking for data to develop their models or applications. In order to utilize knowledge gained by previous studies, or to utilize historic data that may be applicable in a current study, it is important for this information to be catalogued and readily available for research, monitoring, and review.

Technology and information transfer comprises an important aspect of JFSP and NFP scientific activities. Research projects and other activities need to share their results in various formats such as publications, datasets, models, and tools. However, while valuable data and tools result from these activities, the information resides across multiple systems in different organizations. A number of efforts are underway (the Northwest Fire Research Clearinghouse [FIREHouse], the Fire Research and Management Exchange System [FRAMES], and the Lessons Learned Center) to make fire research and management information more centralized and accessible to scientists, resource managers and the general public. However, to date, none focus specifically on the fire research and management information needs of Alaska.

In response to JFSP AFP 2005-4, Task 2, we propose to expand FIREHouse to Alaska. Fire research information in Alaska is spread across a number of organizations, including the National Park Service, the Bureau of Land Management - Alaska Fire Service, the US Fish and Wildlife Service, the University of Alaska, the US Forest Service, State and Private Forestry, the State of Alaska, the Kenai Peninsula Borough, and various Native Corporations. Varying amounts of information within these organizations are publicly accessible, but there is no single access point for the array of available fire research information. FIREHouse is already improving the accessibility and organization of research and related tools in a user-friendly system in the Northwest, and it has the capacity to expand seamlessly to Alaska.

By providing centralized online access, dissemination and application of Alaska fire and fuels research results, FIREHouse will support the decision-making needs of Alaska’s fire and fuels managers, as well as wildland fire management planning and implementation activities. By increasing access to available information and providing a knowledge base for managers, FIREHouse will assist JFSP in addressing its mission to meet information and technological support needs for wildland fuels management programs across agencies. The information made accessible through this project will provide a basis for adaptive management decisions to refine and improve fuel management programs to meet land and resource management goals. FRAMES is working with FIREHouse to develop the methods and processes needed to expand into other regions, with expansion to the South already underway.

Project Objectives

We will expand the user-friendly FIREHouse to Alaska, in order to provide an effective means to access the wide variety of fire research data and information across the state, thereby aiding scientists, managers, policy makers and the public. Expansion of FIREHouse to Alaska includes the following objectives:

- Develop and post online metadata records for all projects funded by JFSP, applicable NFP-funded projects, and other available fire research projects in Alaska.
- Post online publications, proposals and study plans from Alaska fire research projects.
- Provide online links to other sources of fire science and management information.
- Post online data from funded JFSP projects (and NFP and other projects, as available).
- Develop an online map interface displaying fire-effects plot metadata in Alaska.
- Advance the Alaska Fire Reference Database by converting it into an online, searchable bibliographic database.

Deliverables will be incorporated into FRAMES, as appropriate, either upon completion of the project or toward the end of the proposed timeline.

Background

The fire science community comprises a complex network of people and products. An online archive of data and associated information is the current standard for making scientific and management products available, and is a critical capability needed by JFSP and NFP (PCAST 1998). Participation in the National Biological Information Infrastructure (NBII) and National Spatial Data Infrastructure (NSDI) is an overarching requirement for all projects that collect data on federal lands or are funded by the federal government (OMB Circular A-16; Executive Order 12906). It also relates directly to revisions to OMB Circular A-122 and language contained in PL 105-277 that emphasize the need to make public information more widely available.

FIREHouse is currently improving the accountability and credibility of JFSP and NFP science in the Northwest by expanding on existing reporting requirements. In 2003, JFSP funded the Fire and Environmental Research Applications Team (FERA) of the USDA Forest Service Pacific Northwest Research Station, Pacific Wildland Fire Sciences Laboratory, and NBII to develop FIREHouse (project number 03-4-2-06: A regional information node for fire science in the Pacific Northwest, in response to AFP 2003-4, Task 2), with the goal of providing user-friendly, web-based data and documentation on fire science and technology relevant to Washington, Oregon and Idaho. This project is an extension of prior efforts in natural resource informatics, including the Olympic Peninsula Clearinghouse (<http://www.onrc.washington.edu/clearinghouse>) (Norheim et al. 1999), the NBII Pacific Northwest Information Node (PNWIN, <http://pnwin.nbii.gov>), and NBII's collaboration with FRAMES.

FIREHouse is coordinating efforts with the FRAMES project team (FRAMES was also funded by JFSP in 2003, project number 03-4-1-02: An expert system and new Web interface for tools on the fire research and management exchange system) to develop the Northwest Fire Science Portal. FRAMES is supporting the development of geographic portals that correspond to the Geographic Area Coordination Center structure developed by the National Interagency Fire Center and National Wildfire Coordinating Group for wildland fire management. These geographic portals will aggregate content (especially research) at scales relevant for fire management. The goal is to crosswalk information gathered by FIREHouse to the FRAMES Northwest Fire Science Portal during the summer of 2005. Additionally, in 2004 JFSP funded FRAMES to team up with NBII, the USDA Forest Service Southern Research Station, the Tall Timbers Research Station, and The Nature Conservancy to develop the Southern Fire Science Portal (project number 04-4-1-34: An internet based portal for Fire Science and Management in the Southern Region). If FIREHouse is extended to Alaska, the Alaska component of FIREHouse will contribute to an Alaska Fire Science Portal, leveraging the cooperation between FIREHouse, NBII and FRAMES into a more comprehensive information sharing system benefiting fire managers and researchers in Alaska and the broader wildland fire community.

Clarification of the FIREHouse-NBII-FRAMES Relationship

Supported by JFSP and NBII, FIREHouse has been a stand-alone website with no dynamic linkage to NBII while under development, although metadata records reflecting some of the projects posted on FIREHouse have been uploaded to NBII. The current FIREHouse (Northwest) project, for which Jennifer Pollock of NBII is one of the co-PIs, maintains frequent communication with Greg Gollberg and Merrick Richmond of the FRAMES project, either through in-person meetings or conference calls as FRAMES develops using the NBII Portal technology architecture. During a transition period (starting in the summer of 2005), while FRAMES progresses with its integration with NBII, the FIREHouse web and database programmer (Paige Eagle), the FRAMES metadata specialist (Merrick Richmond, who actually resides in Seattle), and the NBII/FRAMES database programmer (Ian Boyd) will develop a crosswalk between FIREHouse's database fields and those in the FRAMES/NBII infrastructure. This crosswalk will enable information gathered by FIREHouse to be automatically uploaded to and displayed on FRAMES, which in turn would be searchable within NBII.

At a minimum, throughout the duration of the Alaska FIREHouse project funded by JFSP, FIREHouse will maintain an independent web presence. If, during the next 12 months (i.e., by the spring of 2006), FIREHouse is satisfied that FRAMES is a viable, useful, well-designed site for fire science and technology information transfer, it will release its postings to FRAMES/NBII at the end of this project (December 2006) and exist solely through FRAMES/NBII. As mentioned earlier, the effort to crosswalk FIREHouse to FRAMES will begin during the summer of 2005. If FRAMES/NBII does not meet these criteria, then FIREHouse will utilize Ian Boyd to do one of the following: either 1) transfer FIREHouse directly to NBII in a form comparable to its current form, but where the underlying database incorporates the improved cataloging tool that NBII is currently developing (NBII would then serve FIREHouse), or 2) create a crosswalk from FIREHouse (housed on a Forest Service server) so the site would dynamically link to the NBII cataloging tool, and therefore the project information posted on FIREHouse would be uploaded and searchable through NBII, but FIREHouse would remain an independent website. The first option is the preferable option, as it helps ensure the longevity of the FIREHouse effort. The second option would occur only if FIREHouse was not satisfied with the organization and display of its information through NBII, and ideally the second option would only be a temporary situation, until the FIREHouse project could be satisfactorily displayed through NBII.

Materials and Methods

A variety of efforts will be necessary to accomplish an effective expansion of FIREHouse to Alaska, not the least of which will be ongoing communication with Alaska fire researchers, managers and other user groups, as well as with the JFSP Program Office and NFP Coordinators, to ensure that we will meet their needs for communicating data and information. Their assistance in facilitating submission of data and products to FIREHouse by JFSP and NFP investigators will be needed to ensure compliance with program objectives and legal requirements.

One of the earlier tasks of this project will be to hold a workshop of fire scientists, fire managers and information technology specialists from Alaska. This workshop will identify priority projects for expansion of FIREHouse to Alaska, clarify the details about the fire-effects information database and the Alaska Fire Reference Database, and communicate priorities for technology transfer and general usability. We will maintain contact with workshop participants throughout the course of the project and rely on them to be FIREHouse beta-testers.

The objectives of the project will be addressed as follows:

Objective 1 – Develop and post online metadata records for all projects funded by JFSP, applicable NFP-funded projects, and other available fire research projects in Alaska.

We will develop metadata for all applicable projects using the Biological Data Profile (FGDC Biological Data Working Group and USGS Biological Resources Division 1999) of the Federal Geographic Data Committee

standards (FGDC 1998) for the development of complete documentation. These metadata will use a standard vocabulary and thesaurus to ensure efficient searching of the metadata records and compatibility with the national NBII framework. A metadata specialist will be responsible for working with investigators to ensure accurate metadata. Metadata records will be posted online after review and approval by investigators. When necessary, this will be accomplished through personal visits by our project staff with individual PIs; we will compile all the metadata ourselves, requiring minimal effort on behalf of the PIs.

Figure 1 demonstrates FIREHouse's simplicity of format and navigation. At present, a user can search for a project by region, study type, subject, and/or keyword. Figure 2 shows information currently available for a JFSP-funded project posted on FIREHouse (a link to the project's website, a fact sheet, a metadata report, and a study proposal).



Figure 1. A screenshot (December 2004) of FIREHouse's home page.

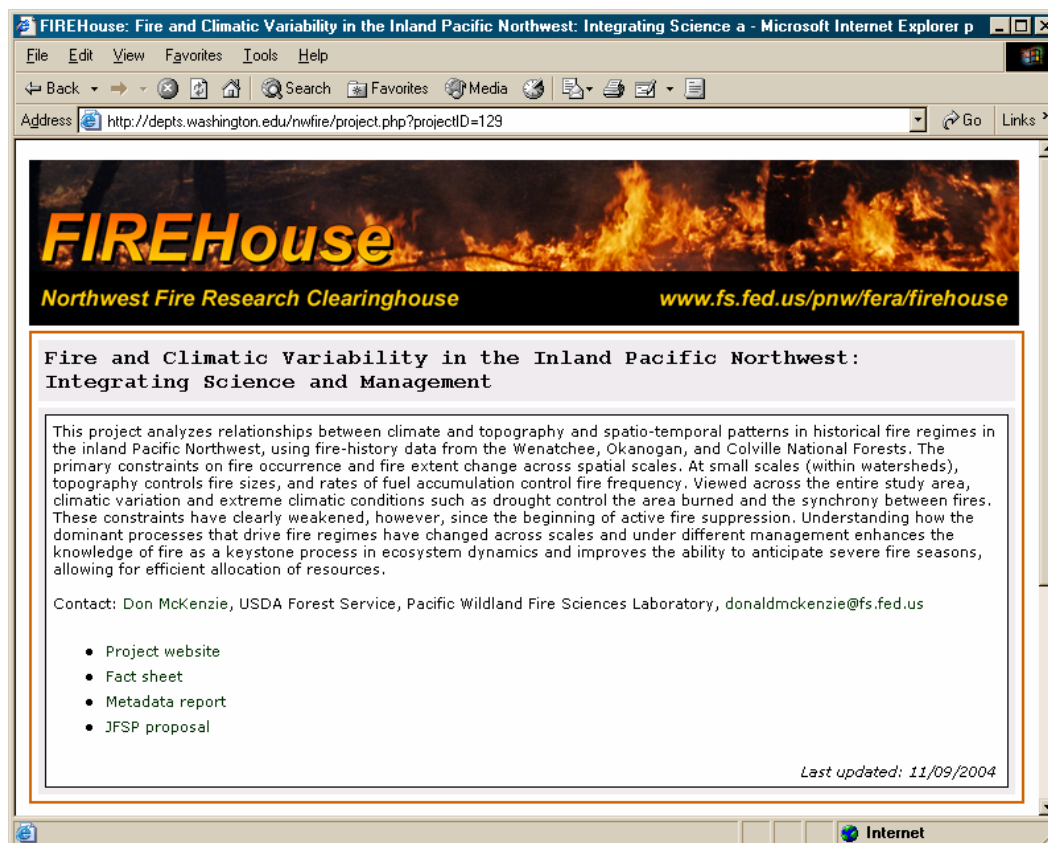


Figure 2. A screenshot (December 2004) of a JFSP-funded project posted on FIREHouse.

Objective 2 – Post online publications, proposals and study plans from Alaska fire research projects.

Publications and reports resulting from JFSP, NFP, and other fire-related projects in Alaska will be posted online. Additionally, the original proposals and study plans for JFSP-funded projects will be posted, so that methodology can be shared and evaluated among scientists and resource managers. Documents will be posted in .pdf format (and .doc format, when necessary), so that they can be readily downloaded by users. A search tool will allow users to scan the publications for key words and concepts. As available, key publications about boreal fire research outside of Alaska (e.g., Canada, Russia, and Scandinavia) will also be posted online.

Objective 3 – Provide online links to other sources of fire science and management information.

Key links to sources of fire science and management information in Alaska will be posted on FIREHouse to provide a broader scope of information for FIREHouse users. As available, links to fire research information from boreal ecosystems outside of Alaska will also be posted.

Objective 4 – Post online data from funded JFSP projects (and NFP and other projects, as available).

We will provide server space, web and database support for researchers who choose to post their primary data on FIREHouse. We will initially contact investigators by email, and address issues such as standard protocols for data reporting management. We will visit each one personally and assist them as needed to ensure that data are checked for errors and quality assurance. Data will be compiled and posted online after review and approval by investigators. We will be sensitive to releasing these data subject to publication of study results, and will not post any proprietary information (e.g., the location of endangered species). We currently have access to several studies of fuel consumption in Alaska for which we can obtain permission to make the data publicly available.

Objective 5 – Develop an online map interface displaying fire-effects plot metadata in Alaska.

The Alaska Fire Effects Task Group, a subcommittee of the Alaska Wildland Fire Coordinating Group's Fire Research Development and Applications Committee, has identified the need for a database that provides site-level metadata and locations for fire-related studies. Fire-effects plot metadata collected by the National Park Service in Alaska will be used to develop a web-based interface that will provide metadata and/or plot data geospatially, using ESRI ArcIMS (or comparable technology). The system will allow a user to click on a location and display the metadata about fire-effects information collected for that area (Figure 3). A user will also be able to search the metadata through a subject or keyword search. This database will then be expanded to include information from other agency fire studies in Alaska, and could eventually serve as a prototype for displaying fire study metadata across the rest of the United States.

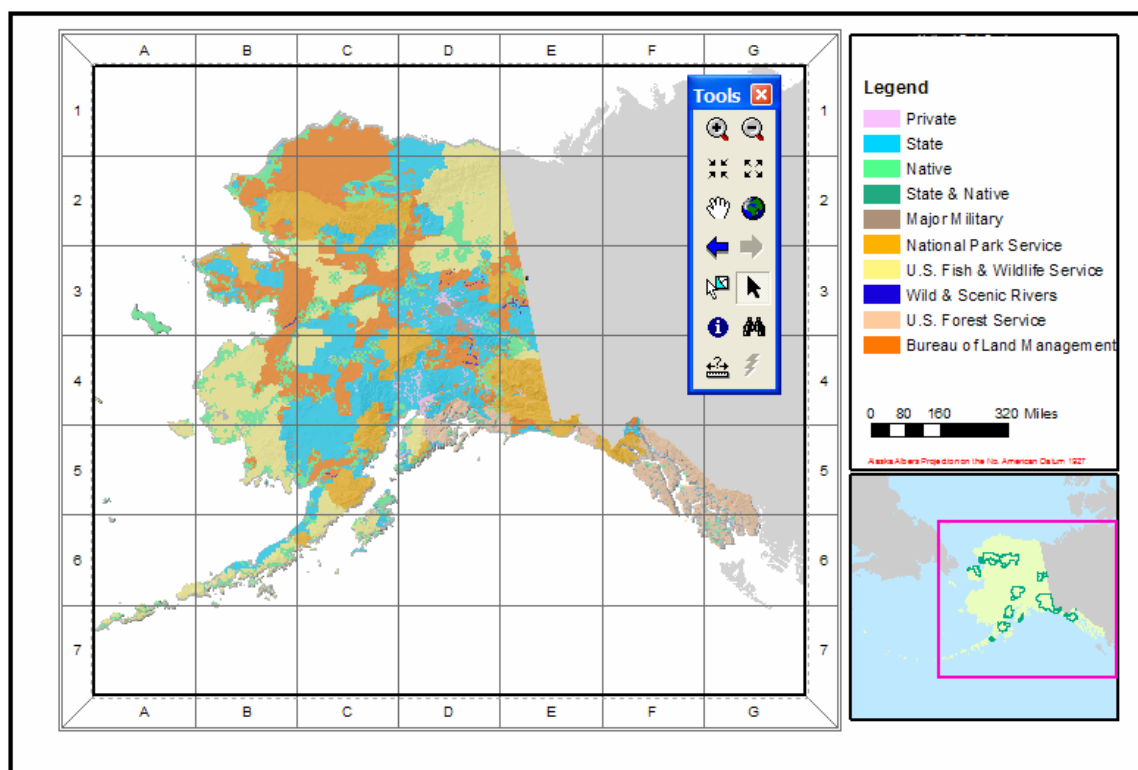


Figure 3. Using an ArcIMS platform, users can click on a grid to find metadata and, if applicable, available data sets or reports for fire studies in the area.

Objective 6 – Advance the Alaska Fire Reference Database by converting it into an online, searchable bibliographic database.

The Alaska Fire Reference Database is an effort originated by the Alaska Fire Effects Task Group. The current purpose of this reference collection is to share unpublished agency reports and works in progress relating to fire research, fire-effects, and fire ecology in Alaska that would not normally be found in the published literature, as well as a comprehensive listing of Alaska fire studies. The database is currently available only as a downloadable ProCite® file, and is in need of cleaning and expansion. The FIREHouse team will work with the Alaska Fire Effects Task Group to expand and update the existing reference database, and make it available online. This effort would occur in cooperation with the Southern Fire Science Portal's incorporation of the Tall Timbers Research Station's E.V. Komarek Fire Ecology Database into FRAMES, thereby ensuring its compatibility with other online bibliographic efforts.

Computational resources

The Pacific Wildland Fire Sciences Laboratory has an exceptional computing environment for serving FIREHouse. We have a cluster of 22 dual processor 1 GHz computers running the Linux operating system, capable of about 50 billion floating point operations per second. We also have two additional timeshared computers, each with dual 2 Gigahertz microprocessors. Through our cooperative agreement with the University of Washington, we have a dedicated network connection capable of moving 7.5 million bits per second. We also have an automated tape library for doing backups without human intervention, and a dedicated firewall to protect some of the machines, while other machines are on a private local area network. All of this computing power sits in a computer room with dedicated power, cooling, and security

Project Team

Personnel	Responsibility
Diana Olson – Forest Service, Pacific Wildland Fire Sciences Laboratory	PI; coordinate and provide technical oversight of FIREHouse; acquire fire research project information and data, publications and bibliographic info; design and write tech transfer components; write non-technical components and documentation; communicate with fire community; manage data; develop web site content; ensure data protocols; edit technical information
David Peterson – Forest Service, Pacific Wildland Fire Sciences Laboratory (contributed effort)	Co-PI; manage budget; communicate with fire community
Jennifer Pollock – USGS NBII Program (contributed effort)	Co-PI; maintain linkages with national NBII program and other programs; facilitate integration of FIREHouse with NBII and FRAMES
Jennifer Allen – National Park Service (contributed effort)	Co-PI; data contribution and oversight of the online fire-effects plot metadata map interface development
Paige Eagle – College of Forest Resources, University of Washington (contributed effort)	Program web applications; design and maintain web site; develop databases and manage data structure; ensure server operability
Rob Norheim – College of Forest Resources, University of Washington (contributed effort)	GIS support; technical development of the online fire-effects plot metadata infrastructure and map interface; oversight of metadata record development
Technical Information Specialist, Forest Service, Pacific Wildland Fire Sciences Laboratory	Develop metadata records; enter and update information into the Alaska Reference Database
Ian Boyd – USGS NBII Program	Database coordination between FIREHouse, NBII, and FRAMES; develop appropriate computer interfaces; ensure protocols and security
Kelly O'Brian – College of Forest Resources, University of Washington (contributed effort)	Outreach, design and write tech transfer components, write non-technical components and documentation
Randi Jandt – BLM-Alaska Fire Service (cooperator)	Contribution of the Alaska Fire Reference Database and oversight of its improvement and conversion to a web application
Karen Murphy – USFWS (cooperator)	Data contribution and content guidance
Greg Gollberg – University of Idaho (cooperator)	Facilitate integration of FIREHouse with FRAMES

Science Delivery and Application

FIREHouse currently provides user-friendly, web-based information about fire science and technology relevant to the Northwest. By facilitating dissemination of fire research results to resource managers, decision makers, and the general public, it is assisting JFSP in addressing its mission to meet information and technological support needs for wildland fuels management programs across agencies. The expansion of FIREHouse to Alaska will provide a key, online access point for resource managers, decision makers, scientists, students, and communities who want access to the results of efforts to understand and manage fire and fuels on public lands in Alaska.

An initial workshop will engage Alaska's fire community in planning and contributing to the development of the project. A second workshop (one year later) will solicit feedback on the usefulness of the clearinghouse, the online map interface of fire effects plot metadata, and the online posting of the Alaska Reference database. If possible, both workshops will be held in conjunction with the Alaska Wildland Fire Coordinating Group's (AWFCG) 2005 and 2006 Fall Fire Reviews. Interim reports, fact sheets, and executive summaries will be prepared and distributed to resource managers and others in the fire community, as well as governor's offices, state legislatures, and Congressional delegations. Participation in workshops, conferences, fuels planning meetings, and any other relevant meetings, will supplement online, e-mail and personal communication efforts to promote the use of FIREHouse, and to solicit feedback for improvements. Additionally, the development of an online map interface displaying fire-effects plot metadata in Alaska, and the improvement, expansion and online posting of the Alaska Reference Database will allow fire researchers and managers easy access to fire research that has previously been difficult to obtain.

Deliverables

Deliverable	Description	Delivery Date
Website	Website with online access to information about fire research in Alaska, including: 1) metadata; 2) on-line publications; 3) bibliographic information, proposals, and study plans; 4) links to other sources of fire information; 5) information about technology transfer and applications in resource management; and 6) an educational component that uses common language and graphics to explain important findings. Server space, web and database support will also be provided to researchers who choose to post their primary data.	Ongoing throughout timeframe of project
Workshops	Workshops with Alaska fire managers and researchers, soliciting feedback and suggestions about the design and content of the project.	October 2005 and October 2006
FRAMES Alaska Fire Science Portal contributions	Contribution and/or transfer of content to the FRAMES Alaska Fire Science Portal.	December 2006
Online fire-effects plot metadata map	Online map interface displaying fire-effects plot metadata in Alaska.	December 2006
Online posting of reference database	Improvement, expansion, and the online posting of the Alaska Reference Database	December 2006
Publication(s)	Publication(s) documenting project development and lessons learned.	Submit December 2006

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